REMARKS

By this amendment applicant submits new claims 29-40. The new claims are directed in apparatus and method for removing contaminates from an industrial process fluid contained in an industrial process unit. Both the apparatus and the method relate to the vent pipe 123 used in conjunction with collection unit 122 to remove contaminants from the industrial process fluid support for the new claims can be found on pages 11 and 12 of the specification and in figures 4-6 of the drawings. Therefore, no new matter has been added.

Applicant has also made minor corrections to the specification and the drawings to unify terminology and to include missing reference numerals.

Applicant respectfully request allowance of all the pending claims as filed.

Respectfully submitted,

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Another method is provided in which fluid is driven into a process unit through utilization of a propulsion unit operating in a process mode. A process is performed in the process unit which utilizes the fluid. Fluid contaminated by the process is collected in a collection unit. The propulsion unit is set to operate in a recycling mode through setting a first port opening of a first control valve in alignment with plumbing that couples the first control valve to an inlet of a pump, setting a second port opening of the first control valve in alignment with plumbing that couples the first control valve to an outlet of the collection unit, setting a first port opening of the second control valve in alignment with plumbing that couples the second control valve to an outlet of the pump, and setting a second port opening of the second control valve in alignment with plumbing that couples the second control valve to an inlet of a recycling unit. The propulsion unit is utilized to drive contaminated fluid through the recycling unit to remove purified fluid from the contaminated fluid, to direct the purified fluid through a permeate line into the process unit, and to direct the contaminated fluid back into the collection unit.

Referring to FIGS. 1 and 2, an industrial process system 100 comprises industrial process unit 102, propulsion unit 104, purification unit 106, and check valve 108.

Industrial process unit 102 contains an industrial process fluid 101 and comprises a device that performs an industrial process through utilization of pump driven industrial process fluids. An example of such a device is an aqueous parts washer which cleans dirty industrial parts through employment of pressure driven industrial process fluid. The pressure used to drive the industrial process fluid 101 into the process unit is used to create a spray that is directed at a dirty industrial part. The spraying action mechanically assists the chemical cleaning action of the industrial processing fluid 101 to clean the industrial part.

plumbing 118 to an outlet 121 of pump 112, and coupled through a sixth length of plumbing 138 to an inlet 139 of recycling unit 124.

Purification unit 106 comprises collection unit 122 and one or more instances of recycling unit 124. Collection unit 122 is coupled through plumbing 126 to an output of recycling unit 124.

Collection unit 122 includes vent pipe 123 and drain 125. Collection unit 122 is utilized to collect contaminated industrial process fluid from industrial process unit 102, as will be discussed herein. An example of a collection unit 122 is a process tank. Collection unit 122, as shown in FIGS. 1 and 2, is an enclosed vessel. The fluid level in collection unit 122 is at lower vertical level than the fluid level in the industrial process unit 102. Alternatively, collection unit 122 could be an open top vessel with a fluid level at the same vertical height as the fluid level in industrial process unit 102.

In one example, vent pipe 123 vents air from [process tank] collection unit 122. In a further example, vent pipe 123 extends to at least the height of the fluid in industrial process unit 102. This allows the fluid level in vent pipe 123 and the fluid level in industrial process unit 102 to reach a state of equilibrium, as will be discussed herein.

Drain 125 is used to remove fluid from [process tank] collection unit 122.

Recycling unit 124 recycles industrial process fluid contaminated by the process carried out in process unit 102, as will be discussed herein. Examples of recycling unit 124 include

position. Specifically in the process mode, port opening 111 of control valve 110 is aligned with plumbing 132 and port opening 113 of control valve 110 is aligned with plumbing 116. In a similar manner, port opening 117 of control valve 114 is aligned with plumbing 134 and port opening 119 of control valve 114 is aligned with plumbing 118.

In the process mode, pump 112 of propulsion unit 104 draws industrial process fluid 101 from industrial process unit 102, through plumbing 132 and port opening 111, into control valve 110. Control valve 110 diverts the fluid, through port opening 113 and plumbing 116, to pump 112. Pump 112 propels the fluid, through plumbing 118 and port opening 119, into control valve 114. Control valve 114 diverts the fluid, through port opening 117 and plumbing 134. Accordingly, fluid is driven by propulsion unit 104 into industrial process unit 102. Industrial process unit 102 then employs the fluid to perform an industrial process.

While industrial process unit 102 operates in process mode, propulsion unit 104 causes industrial process fluid 101 to circulate through industrial process unit 102. Contaminants therefore begin to accumulate in the industrial process fluid 101. For instance, in an example of an aqueous parts washer 300 shown in FIG. 3, industrial process fluid 101 is drawn from reservoir 302 through plumbing 132 to propulsion unit 104. The industrial process fluid passes through propulsion unit 104, as described above with reference to FIG. 1, and through plumbing 134 to spray nozzles 304. Spray nozzles 304 then spray industrial parts 306. As industrial parts 306 are sprayed, industrial process fluid and contaminants removed from industrial parts 306 flow back into reservoir 302. Aqueous parts washer 300 then reuses the industrial process fluid. Over a period of use, contaminants from industrial parts 306 accumulate in the industrial process fluid 101.

Therefore, fluid contaminated by the process needs to be recycled by purification unit 106 and passed back to the acquaeous parts washer through permeate line 130, as will be discussed herein.

Turning back to FIG. 1, collection unit 122 collects contaminated fluid from industrial process unit 102. In one example, since collection unit 122 of purification unit 106 is vertically lower than industrial process unit 102, the force of gravity propels industrial process fluid (including any contaminants) from industrial process unit 102 through fill line 128 into collection unit 122. Check valve 108 prevents fluid backflow from collection unit 122 to industrial process unit 102. In one example, when the fluid level in vent pipe 123 and the fluid level in industrial process unit 102 reach an equilibrium, flow of contaminated fluid into collection unit 122 ceases. Accordingly, collection unit 122 is at capacity and no fluid can flow into collection unit 122.

Referring to FIG. 2, contaminants are removed from the industrial process fluid by placing industrial process system 100 in recycle mode. To place industrial process system 100 in recycle mode, propulsion unit 104 must be set to operate in recycle mode by setting control valve 110 and control valve 114 to a recycle mode position. In recycle mode, port opening 111 of control valve 110 is aligned with plumbing 116 and port opening 113 is aligned with plumbing 136. In a similar manner, port opening 117 of control valve 114 is aligned with plumbing 118 and port opening 119 is aligned with plumbing 138.

In recycle mode, pump 112 draws contaminated industrial process fluid from [recycling] collection unit 122, through plumbing 136 and port opening 113, into control valve 110. Control valve 110

fluid 101 from process unit 102 through plumbing 132. The fluid 101 is circulated through propulsion unit 104, as described above with FIG. 1, and driven back into process unit 102 through plumbing 134. In recycle mode, purified fluid is driven into process tank through permeate line 130.

In FIGS. 4-6, however, industrial process system 100 also employs vent pipe 123 to collect contaminated fluid. In one example vent pipe 123 gravitationally separates and removes one or more free oils from [process tank] collection unit 122. This arrangement is based on the principle that, in an immiscible mixture of fluids, a fluid with a lower specific gravity (e.g., oil) will float above a fluid with a higher specific gravity (e.g., water). This arrangement can be used in addition to, or as an alternative to, the recycle mode described above, to remove free oils from industrial process system 100. Employment of such an arrangement could extend the useful life of recycling unit 124.

For instance, if recycling unit 124 were a membrane module, performance of the membrane module would degrade significantly in the presence of free oil, due to fouling. Fouling is a phenomenon by which excessively concentrated contaminants partially or completely block the pores in the membrane that allow for efficient passage of clean process fluid. A fouled membrane is not able to economically deliver clean permeate at an acceptable rate. If the membrane were to become fouled, the contents of the process [tank] unit 102 would need to be discharged. The vent pipe 123 allows for removal of free oil; thus the interval between process [tank] unit 102 discharges can be extended almost indefinitely. The removed free oil has minimal or no water content and can often be sent off site to recover its energy content.